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AUTHOR Botsford, Keith

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ABSTRACT

Three models for anlayzing the Tuition Advance Fund (TAF) are examined. The three models are: projections by the Institute for Demographic and Economic Studies (IDES), projections by Data Resources, Inc. (DRI), and the Tuition Advance Fund Simulation (TAFSIM) models from Boston University. Analysis of the TAF is based on enrollment, price, and repayment schedules, which depend on income projections. It is claimed that all three models are working on totals that are not acceptable, because they gloss over substantial differences between the types of institutions and the two sectors of higher education that must be taken into account. It is claimed that the TAFSIM model shows convincingly that if the Congress creates TAF, the projected 1979 appropriation of $4.5 billion would be sufficient, under any of the four alternative plans for the state sector suggested by Boston University, to defray the costs of the program in the initial year. Graphs are appended that illustrate the repayment schedules of the TAF under Congressional Appropriation Plan I, and each of the four tuition plans for the state sector is presented. (SW)

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THE TUITION ADVANCE FUND

AN ANALYSIS PREPARED FOR BOSTON UNIVERSITY

BY

KEITH BOTSFORD

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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SUMMARY

The Tuition Advance Fund Simulation (TAFSIM) model that I have developed shows convincingly that if the Congress of the United States creates the Tuition Advance Fund, the projected 1979 appropriation of $4.5 billion (which, adjusted for inflation at 6%, would mean an appropriation of $4.77 billion were the program to go into effect in 1980) would be sufficient, under any of the four alternative plans for the state sector suggested by Boston University, to defray the costs of the program in the initial year; assuming, that is, that not more than 50-55% of those eligible choose to participate and that all of those participating use their maximum possible borrowing power.

The TAFSIM model also shows that the second question -- will the TAF be ultimately self-sustaining and, if so, when? -- can only be answered after the Congress has taken certain necessary decisions. As those decisions are perforce political, this paper does not presume to offer any advice on the subject.

The options, however, can be stated as follows.

(1) The Congress makes an annual appropriation for the TAF based on the costs of the previous year and intended to be adequate for the next year's costs; any unexpended funds revert to the Treasury. On this basis, the Tuition Advance Fund will become self-sustaining in 39 to 45 years, depending on which tuition plan one accepts for the state sector (the four alternative tuition plans suggested by Boston University are described on page 12).

(2) If, on the other hand, the Congress establishes a fixed annual appropriation, which begins at $4.5 billion and is indexed annually to inflation, and any excess of appropriation in any year is left to accrue in the Fund, then the Year Zero at which the TAF becomes self-sustaining lies between years 10 and 17. This form of appropriation is in accordance with the TAF plan originally proposed by President John R. Silber of Boston University.

I - ENROLLMENT

The three studies I have read vary widely on their estimates of enrollment and costs. All three -- the DRI study, the IDES report, and the original Boston University models -- were constructed to be fed into computers. There is always a danger in this process, because errors are thereby mechanically multiplied, and in this instance, all three share a common defect in that they have taken various short-cuts to make their computer models manageable in size.

As there are three basic givens in any analysis of the TAF -- enrollment, price, and repayment schedules, which depend on income projections -- any error in any part of these will affect the picture of the whole and can skew an entire curve. And as two of these variables -- price and enrollment -- vary substantially between the two-year and the four-year institutions and between the state and the independent sectors, it seemed to me essential to break down each of those as reliably as possible before arriving at any totals.

I have been, therefore, quite summary in my analysis of the three models because all of them are working on totals which do not seem to me acceptable; they gloss over substantial differences between the types of institutions and the two sectors in higher education which must be taken into account.

A. The Instutute for Demographic & Economic Studies (IDES)

The enrollment figures used in the IDES report (Final Memorandum on Alternative Federal Loan Programs and Proposals, Stephen P. Dresch, November 14, 1978), from which aggregate costs are derived, are taken from the National Center for Education Statistics (NCES) publication, Digest of Education Statistics, 1977-78.

The table of enrollment devised by IDES as a representative cut of the student population is for full-time undergraduates. Graduate students and first-professional students (the latter are defined by NCES as students in programs requiring at least two years of previous college work for entrance and at least six years of college work for completion) are excluded.

Notes

(1). The part-time student population is not worked out to full-time equivalents, as it should be for the purposes of the TAF proposal.

In the TAFSIM model. we assume three part-time students to be equivalent to one full-time student. There are 2,563 part-time students in Fall, 1976, so applying our formula to this figure, we come up with a total of 854. (All enrollment figures in this report will be given in thousands: 2,563 is to be read as 2,563,000, 854 is to be read as 854,000, and so

forth). This figure, added to the IDES figure of 5,880, gives a full-time equivalent total of 6,734 as the total pool of eligible undergraduates.

(2) From these, IDES did not subtract non-degree students, as specified by the TAF proposal.

Table 83 of the Digest of Education Statistics provides 1975 figures, which was the last year that the NCES chose to examine this particular category. The proportions of non-degree students to degree-students (which vary greatly according to the type of institution, with a heavy concentration at the two-year level) are given there as follows.

PROPORTION OF NON-DEGREE STUDENTS PER TYPE OF INSTITUTION AND SECTOR

STATE SECTOR		INDEPENDENT SECTOR	
2-Year	4-Year	2-Year	4-Year
35%	1.4%	18%	.996% (a)

The IDES figures should be adjusted accordingly.

(3) Taking out non-degree students, the IDES pool of eligible students is reduced from 6,735 to 5,898. We then subtract freshmen, who are assumed, on the basis of data provided by NCES, to constitute 22% of the student body in four-year institutions and 65% of the student body in two-year institutions. The total is thus reduced to 3,983.

Comment

(1)This is the lowest estimate of a base-year enrollment (b) in any of the studies I have reviewed. As we will see, the estimate accords with Mr. Dresch's view that a very large decline in the student population is to be expected between 1980 and 2000.

(a) In the TAFSIM model, the proportions are weighted to account for the disparate numbers in the several sectors. For example, 18% of the student body in the two-year independent institutions are non-degree students, and 35% in the two-year state instituions; since enrollments in the state sector are far larger, 34.75% is taken as the proportion of non-degree students in all two-year institutions. The proportion of non-degree students in all four-year institutions is taken to be 1.1%.

(b) Academic Year 1978-9 is referred to throughout as 1979, etc.

(2) All IDES enrollment figures are for 1976, the last known year.

B. Data Resources, Inc. (DRI)

Notes

(1) DRI figures come in three versions: one set contained in their first report (An Analysis of the Tuition Advance Fund Bill, September 29, 1978), the other two after the figures in this report -- which grossly distorted the intent of the TAF -- were challenged by Boston University. The Addendum to the original report, issued on November 2, 1978, should be consulted for their two sets of revised figures.

(2) All DRI figures are based on NCES projections made in 1977 (Projections of Education Statistics to 1985-86, National Center for Education Statistics, 1977). They are thus a year less accurate than the figures used in the TAFSIM model, since the NCES Projections published in 1978 take some pains to correct the errors of the previous year.

(3) To arrive at its base enrollment figure of 8,450, DRI has taken NCES projections for 1980 and divided those projections into the state and independent sectors. Graduate students were then eliminated, using the proportions given in the NCES figures.

(4) A later DRI document (the Addendum referred to above) then eliminated also first-professionals.

(5) Using more recent NCES projections (1978), the DRI estimates (on their own calculations) can be corrected to provide an initial pool of 8,043. The initial error here was +4.82%.

(6) Bringing their subsequent analysis of first-professionals in the eligible pool up to later NCES data,, one arrives at a total pool of 7,762. The error is now +6.2%

(7) Column 3 of the DRI revised figures reluctantly eliminates non-degree students. As justification for this reluctance, I could find nothing but a flat assertion that to eliminate non-degree students would be unrealistic, as the eligible could not be distinguished from the ineligible in this group. But the TAF proposal specifically excludes non-degree students, and so they have been eliminated from our model.

The appropriate multiples for eliminating non-degree students are, as mentioned in the IDES comments, 34.75% in two year institutions and 1.1% in the four-year.

Comments

(1) It is very difficult to correct DRI figures, which are based on NCES FTE tables, because our model uses a more detailed analysis of enrollment in each of four sectors. Even within those bounds, however, the final pool of DRI as corrected by 1978 NCES data works out at 4,211, almost exactly half of the 8,450 furnished by DRI in its initial analysis.

C. The TAFSIM model

The TAFSIM model, prepared for this report on data furnished to the author by Mr. William Marshall of Boston University, is based on a modified version of the NCES low-curve enrollment projections for 1980 (Projections of Education Statistics to 1986-87, NCES 1978).

The NCES projections are based on age-specific enrollment rates between 1967 and 1977. Their high-curve and intermediate-curve projections assume, to different degrees, the straight-line continuation of the high enrollment ratios of the past decade. Their low-curve projection assumes that 1975 and 1976 enrollment ratios will remain constant through 1986.

I have assumed the NCES low-curve projections to be the most reliable. These predict a decline of 6% in total college enrollments between 1980 and 1986. Furthermore, it is my judgement, based on my review of census data and current enrollment data, that the long-awaited leveling off and subsequent decline in enrollments will begin sooner than expected and that its effects will probably be visible by 1980. Therefore I have adjusted the NCES projections by two years. The NCES 1982 projection is used as the base year for 1980, and every subsequent projection has been set back by two years. Doing this alters the base-year enrollment by a little over 4% in the independent sector and by about 2.5% in the state sector, and means a slight increase in the subsequent rate of decline. It corresponds more closely to observable trends in enrollments by flattening out the enrollment curve in the initial years of the TAF and anticipating the projected decline of that curve by two years.

In support of this curve one could cite such studies as Stephen P. Dresch's articles "Demography, Technology and Higher Education," Journal of Political Economy (1975), and "Ability, Fertility and Educational Adaptation," Research in Population Economics (1978); and Michael S. McPherson's "The Demand for Higher Education," in Public Policy and Private Higher Education, edited by David W. Breneman and Chester E. Finn, Jr. (Brookings Institution Studies in Higher Education Policy, 1978). These authors study the implications of the labor market for future college enrollments. By such methods, Richard S. Freeman's The Overeducated American (Academic Press, 1976) predicted a decline of some 5% in undergraduate

enrollments between 1980 and 1990, while Stephen Dresch has predicted a decline of 18% in the college population during that decade.

Our enrollment projections for 1980-1995 follow in Table I. The NCES intermediate curve is given here for the sake of comparison. The NCES high curve, which assumes continued growth, is rejected as extremely unlikely.

It will be noted that the difference between the intermediate curve (which is an average of the high and low curves) and the low curve does not substantially affect the amount of the advances or the repayment schedule, which are dealt with later in this report. The adoption of the intermediate curve in calculating the costs of the TAF would have meant an average increase of some 5% in the annual advances, and would have pushed forward the repayment schedule by about one year.

The NCES projections stop in 1986. After this date I have continued them by the method explained in the notes to Table I. Enrollment has been worked out to 1995, after which the youngest potential student in the cohort is as yet unborn.

Our enrollment projections for 1980-1995, together with the NCES intermediate projections given for comparison, follow in Table I.

The methodology by which they were worked out is as follows:

(1) Taking each of the NCES enrollment tables for two-year and four-year institutions, and after removing graduate and first-professional students, a computation was made of Full-Time Equivalent students on the 3PT = 1FT formula.

(2) From the ensuing totals, non-degree students were removed according to the percentages mentioned above (34.74% in two-year institutions, and 1.1% in four-year institutions).

(3) From the remainder, freshmen were removed according to a different formula for the two-year and the four-year sectors (65% and 22% respectively) because the proportions vary in the two different kinds of institutions.

(4) The percentage of state and independent sector was worked out independently in each table so as to reflect a true proportion to be set against tuition and fees in each instance.

TABLE IA: TAF ENROLLMENT 1980-1995, TWO-YEAR INSTITUTIONS (in 000s)

	INDEPENDENT SECTOR TWO-YEAR		STATE SECTOR TWO-YEAR	
	NCES MED	NCES LOW	NCES MED	NCES LOW
1980	22	20	721	641
1981	22	20	739	643
1982	22	20	755	642
1983	22	20	768	639
1984	22	19	784	636
1985	22	19	781	634
1986	22	19	788	640
1987	22	19	783	636
1988	21	19	765	621
1989	20	18	738	599
1990	19	17	711	577
1991	19	17	698	567
1992	19	17	697	566
1993	19	17	707	574
1994	19	17	707	574
1995	19	17	707	574

NOTES

1. Projections are based on most recent NCES Projections(1978). The formula on which they are based is as follows: full-time students + part-time students (reduced to full-time equivalents), minus graduate & first-professional students as projected by the NCES (& on the same basis of reckoning), subtracting 65% assumed to be freshmen, and again subtracting 34.75% assumed to be non-degree students. (Both these latter percentages based on a 10-year average on known (not projected) data.

2. The NCES projections do not extend beyond 1986 (here taken as 1984 because of the adjustment explained in the text). The projections have been continued by applying for each year the mean percentage of yearly demographic change that has been projected by the Census Bureau for the 17-year-old, 18-year-old, 19-year-old, and 20-year-old cohorts. These projections were taken from the U.S. Department of Commerce Current Population Reports, "Population Estimates and Projections: Projections of the Population of the United States: 1977 to 2050," Series P-25, No. 704, July 1977.

TABLE IB: TAF ENROLLMENT 1980-1995, FOUR-YEAR INSTITUTIONS (1000s)

	INDEPENDENT SECTOR		STATE SECTOR	
	NCES MED	NCES LOW	NCES MED	NCES LOW
1980	1099	1042	2476	2349
1981	1072	1016	2375	2237
1982	1044	986	2375	2237
1983	1014	960	2316	2174
1984	978	925	2260	2116
1985	974	922	2252	2108
1986	983	930	2272	2127
1987	977	924	2257	2113
1988	955	903	2205	2065
1989	921	871	2126	1996
1990	887	839	2047	1917
1991	871	824	2011	1883
1992	870	823	2008	1880
1993	883	835	2038	2008
1994	883	835	2038	2008
1995	883	835	2038	2008

NOTES

1. The formula on which these projections are based is identical to that described in Table IA. After eliminating graduate students and first-professionals, the 22% assumed to be freshmen and the 1.1% assumed to be non-degree students are subtracted.

TABLE IC: TOTAL TAF ENROLLMENT 1980-1995 (in 1000s)

	NCES MED PROJECTIONS			NCES LOW PROJECTIONS		
	INDEP	STATE	COMB	INDEP	STATE	COMB
1980	1144	3304	4448	1062	2990	4052
1981	1094	3169	4263	1036	2940	3976
1982	1066	3130	4146	1006	2879	3885
1983	1036	3084	4120	980	2813	3793
1984	1000	3044	4044	944	2752	3696
1985	996	3033	4032	941	2742	3683
1986	1005	3060	4065	949	2767	3716
1987	999	3040	4039	943	2749	3692
1988	976	2970	3946	922	2686	3608
1989	941	2864	3805	899	2590	3479
1990	906	2758	3664	856	2494	3350
1991	890	2709	3599	841	2450	3291
1992	889	2705	3594	840	2446	3286
1993	902	2745	3647	852	2552	3424
1994	902	2745	3647	852	2552	3424
1995	902	2745	3647	852	2552	3424

II - PRICES

As with enrollment, I must begin with a fundamental criticism that can be applied to all three of the studies I consulted. None of them saw fit to break down the pricing system across the differing kinds of institutions in the two sectors or, if they did, averaged these out without a satisfactory weighting to account for the far greater number in the state sector.

A. IDES Reports

Notes

(1) The IDES prices are based on the NCES Digest 1977-78 (Tables 131 and 132).

(2) The Institute's analyses of costs are constructed on a different basis than that of the TAF proposal, which is quite strict in its definition of maxima, namely: tuition and fees plus up to $1,000 in any given year, up to a maximum of $5,000 (indexed for inflation) in any one year and a maximum of $15,000 for any one student over three years. The IDES figures, on the other hand, in order to be comparable for Mr. Dresch's purpose of analyzing all the available student-loan programs, include all student costs.

(3) The IDES figures are based on 1975 costs and projected forward for any single year in a borrowing period.

(4) IDES then divides those costs into three basic groups: the two-year and four-year prices of institutions in the state sector and the four-year prices in the independent sector. Working then on an NCES Digest projection for 1978 (table 131), IDES makes a mean of the prices in each of these areas which, it says,"correspond to estimates of costs." In fact, they do not really correspond, as a comparison of the IDES prices and the true mean figures from the NCES Digest will show.

IDES AND NCES PRICES (1978) COMPARED PER SECTOR AND TYPE OF INSTITUTION. (a)

	STATE SECTOR		INDEPENDENT SECTOR	
	2-Yr	4-Yr	2-Yr	4-Yr
IDES	2,000	3,000	(--)	5,000
NCES	1,704	2,210	(--)	5,331
PERC ERROR	+17%	+36%		-7%

(a) Includes an additional $1,000 for "other expenses" in all categories.

(5) Using IDES's own preferred figures plus the TAF allowed maxima for "other expenses" and the NCES Projections (1978) the comparative table works out as follows:

IDES & NCES PRICES (1978) COMPARED PER SECTOR AND TYPE OF INSTITUTION

	STATE SECTOR		INDEPENDENT SECTOR	
	2-Yr	4-Yr	2-Yr	4-Yr
IDES	2,000	3,000		5,000
NCES	1,407	2,210	2,758	4,403
PERC ERROR	+42%	+36%	(--)	+14%

(6) When prices are compressed in this fashion and then multiplied by distribution patterns, the result can be quite unrealistic in the model, which is no doubt why IDES (in its earlier report, "A Critique of the Harrington-Silber Tuition Advance Fund," May 15, 1978) came up with an erroneous figure of $7 billion as the annual advance under the TAF.

Assuming 6% inflation to bring the figures up to 1980, the final corrected figures on the IDES model should be:

IDES AND NCES PRICES PER SECTOR AND TYPE OF INSTITUTION (1980 PROJECTION WITH INFLATION 6%)

	STATE		INDEPENDENT SECTOR	
	2-Yr	4-Yr	2-Yr	4-Yr
IDES	2,000	3,000	(--)	5,000
NCES 1980	1,491	1,845	2,923	4,667
PERC ERROR	+34%	+63%	(--)	+7%

Comment

The NCES Digest's analysis of tuition and fees (Table 131, NCES Digest, 1978), broken down into two-year and four-year institutions, are fairly accurate. They are based on the Fall enrollment 1978.

When we turn, however, to the NCES Projections, not only do the projections of tuition and fees seem high, but they can be proven high by checking them against more recent data. This is because the basis for their projections has been to trace the

trend of increase in higher education prices on a steady curve without taking into account the pressures that have militated to keep these prices more or less within bounds, i.e. taxpayer resistance in the state sector and market factors in the independent.

Using the actual costs as reported to the College Board and listed in Student Expenses at Postsecondary Institutions, 1978-79, published by the College Scholarship Service (CSS) in 1978, a much more accurate picture can be drawn.

Prices in the TAFSIM model are based on the CSS prices for 1978 inflated to 1980 at a constant 6%.

B. DRI Reports

Notes

(1) DRI's cost figures are based on the NCES Projections published in 1977, not on the 1978 issue of the Projections, and thus contain an additional degree of error.

(2) Their prices for the two sectors are averages of the two different kinds of institutions. Under the DRI model, the expected advances to be paid students (including the added $1,000 available for "other expenses", $900 in the independent sector, discussed infra) are set out as follows:

AVERAGE COSTS IN THE TWO SECTORS: DRI AND TAFSIM COMPARED

	STATE SECTOR		INDEPENDENT SECTOR	
	2-Yr	4-Yr	2-Yr	4-Yr
DRI	1,701 (Average)		4,120 (Average)	
TAFSIM	1,428	1,682	2,955	3,799

(3) As these averages are then projected against the steeply rising curve of the 1977 NCES Projections, the proportion of error grows annually until by 1990, the last year given in the DRI report, DRI is giving a state sector average of $3,603 (TAFSIM average, unweighted =$2,049) and $8,729 in the independent sector (TAFSIM average, unweighted =$5,331).

Comments

(1) It is perfectly possible that prices may rise more steeply than any model can currently conceive; it is equally possible that market pressures in the independent sector and political and taxpayer pressures in the state sector may inhibit such rises. But the TAFSIM model presumes that the price situation will remain relatively stable.

(2) DRI mentions, however, two factors that must be taken into account in pricing: the demographic trend that favours migration towards the Sun Belt; and the possible competition, under the TAF, between the state and independent sectors.

As to the first, our model assumes that the net internal migration (approximately 12% of students in the state sector currently pay "out-of-state" tuition and fees) will soon be eliminated as a factor by court decisions holding that one year establishes residency in any given state. That one year will normally be the freshman year, excluded from the TAF. I would expect that the remaining price factor will not be statistically significant.

As to the ongoing price war between the state and independent sectors, I see no reason to anticipate any significant change under the TAF. I share the view of Mc Pherson, in the study already cited, that there is no other reason to expect much change in the present competitive positions of the two sectors during a period of declining enrollment.

C. The TAFSIM model

(1) Our model is based on CSS tuition and fees as reported for the AY 1979.

(2) CSS figures are mean figures. Their table 1 (p.iv) puts the relevant prices as follows.

1978 PRICES DERIVED FROM CSS

STATE SECTOR		INDEPENDENT SECTOR	
2-Yr	4-Yr	2-Yr	4-Yr
408	651	1,930	2,647

(3)CSS reports for each sector a different curve of increase in tuition and fees. Applying to the CSS prices these several curves (the multiples 4.9%, 4.8%, 6.5%, and 6.9% in the table below), and adding $1,000 in the state sector and $900 in the independent sector as explained below, the 1980 TAF mean prices would be as follows.

1980 TAF PRICES BY SECTOR AND TYPE OF INSTITUTION AS PROJECTED FROM CSS 1978 PRICES

STATE SECTOR		INDEPENDENT SECTOR	
2-Yr	4-Yr	2-Yr	4-Yr
408 x	651 x	1,930 x	2,647 x
4.9% +	4.8% +	6.5% +	6.9% +
1,000=	1,000=	900=	900=
1,428	1,682	2,955	3,799

(4) The TAFSIM model assumes that each student in the state sector will use his maximum tuition eligibility plus $1,000 for "other expenses," and that in the independent sector each student will use his maximum tuition eligibility plus $900.

The limitation of "other expenses" to $900 in the independent sector is based on the assumption that a statistically significant number of independent institutions will have, by 1980, tuition and fees approaching the TAF maximum of $5,000 p.a. and that students in that sector will consequently not be able to draw the full $1,000 available for "other expenses."

The prices by kind of institution and by sector are listed below in Table II.

There are four possible tuition plans for the state sector according to the models furnished me by Boston University. I call these Tuition Plans A, B, C, and D. Plan A calls for a one-time tuition increase of 10% in the state sector. Plan B calls for a one-time tuition increase of 20% in the state sector. Plan C calls for an annual 5% increase in tuition in the state sector. (In all these plans, tuition increases are in addition to the 6% inflation index.) Plan D assumes that tuition increases in the state sector will be held at the present level, except for the adjustments required by the inflation index.

In the following tables, lines A, B, C, and D, as all other single-letter lines, refer to two-year institutions; lines AA, BB, CC, DD, as all other double-letter lines, refer to four-year institutions. Lines A-D cover the state sector and line E the independent.

Lines A and AA:	A one-time 10% increase in tuition.
Lines B and BB:	A one-time 20% increase in tuition.
Lines C and CC:	An annual 5% increase in tuition.
Lines D and DD:	No increase.

Prices in the independent sector are listed in columns E & EE.

TABLE IIA: PRICES 1980-1995, INDEPENDENT SECTOR
(@ 6% constant inflation)

	TWO-YEAR (E)	FOUR-YEAR (EE)
1980	2055	2899
1981	2178	3073
1982	2308	3257
1983	2446	3452
1984	2593	3659
1985	2749	3879
1986	2914	4112
1987	3089	4359
1988	3274	4621
1989	3470	4898
1990	3678	5192
1991	3899	5503
1992	4133	5833
1993	4381	6183
1994	4644	6554
1995	4923	6947

TABLE IIB: PRICES 1980-1995, STATE TWO-YEAR SECTOR (@6% constant inflation, under four alternative schemes for tuition increase)

	(A) 10% once	(B) 20% once	(C) 5% p.a.	(D) No increase
1980	428	428	428	428
1981	496	539	475	453
1982	526	571	527	480
1983	558	605	586	509
1984	591	641	652	540
1985	626	679	725	572
1986	664	720	807	606
1987	704	763	898	642
1988	746	809	1000	681
1989	791	858	1113	722
1990	838	909	1239	765
1991	888	964	1379	811
1992	941	1022	1535	860
1993	997	1083	1709	912
1994	1057	1148	1903	967
1995	1120	1216	2118	1025

TABLE IIC: PRICES 1980-1995, STATE FOUR-YEAR SECTOR (@ 6% constant inflation, under four alternative schemes for tuition increase)

	(AA) 10% once	(BB) 20% once	(CC) 5% p.a.	(DD) No increase
1980	682	682	682	682
1981	791	867	757	723
1982	838	919	840	766
1983	888	974	932	812
1984	941	1032	1035	861
1985	997	1094	1149	913
1986	1057	1160	1275	968
1987	1120	1230	1415	1026
1988	1187	1304	1571	1088
1989	1258	1382	1744	1153
1990	1333	1465	1936	1222
1991	1413	1553	2149	1295
1992	1498	1646	2385	1373
1993	1587	1745	2642	1455
1994	1682	1850	2938	1542
1995	1783	1961	3261	1635

Table III lists the total advances required under each scheme in each sector by type of institution.

Each entry is a multiple of the projected enrollment for the given year and the projected price per institution.

Columns 1-4 cover the state two-year sector under plans A-D. Columns 5-8 cover the state four-year sector under plans AA-DD, and show the totals A + AA, B + BB, C + CC, and D + DD.

Columns 9 and 10 give the corresponding multiples for the two-year independent institutions (E) and the four-year independent institutions (EE). The totals E + EE are shown.

Column 11 gives the totals when the state and independent advances are added together (A + E, B + E, C + E, D + E), assuming participation by 50% of those eligible.

Finally, Column 12 gives the annual appropriation foreseen (at a constant 6% inflation), and Coumn 13 shows the amount in each year by which that appropriation would be in excess of advances.

TABLE III: TAP COSTS 1980-1995 (Total Enrollment Times Advances, by Sector and by Type of Institution, with Annual Appropriations and Excesses of Appropriations over Advances)

	State 2-Year (A) 10% increase once	(B) 20% increase once	(C) 5% increase p.a.	(D) No increase	State 4-Year (AA) 10% once	(BB) 20% once	(CC) 5% p.a.	(DD) No Increase	Indep. 2-yr (E)	Indep. 4-yr (EE)	Total Costs, State and Independent at 50% participation ($ Millions)	Approp. =4.5 Indexed at 6% ($ Billions)	Excess from Advance ($ Billions)
1980	.641	.641	.641	.641	2.349	2.349	2.349	2.349	.020	1.042	A 4,442	4.77	.33
	x1428	x1428	x1428	x1428	x1682	x1682	x1682	x1682	x2955	x3799	B 4,442		
	915(a)	915	915	915	3,951	3,951	3,951	3,951	59	3,959	C 4,442		
											D 4,442		
					Total A + AA	Total B + BB	Total C + CC	Total D + DD		Total E + EE			
					4,866	4,866	4,866	4,866		4,018			
1981	.643	.643	.643	.643	2.237	2.237	2.237	2.237	.020	1.016	A 4,533	5.06	.53
	x1496	x1539	x1475	x1453	x1791	x1867	x1757	x1723	x3078	x3972	B 4,633		.43
	962	990	948	934	4,006	4,176	3,930	3,854	62	4,037	C 4,489		.57
											D 4,443		.62
					Total A + AA	Total B + BB	Total C + CC	Total D + DD		Total E + EE			
					4,968	5,166	4,879	4,789		4,099			
1982	.642	.642	.642	.642	2.237	2.237	2.237	2.237	20	.986	A 4,627	5.36	.73
	x1526	x1571	x1527	x1480	x1838	x1919	x1840	x1766	x3208	x4157	B 4,733		.63
	980	1,009	980	950	4,112	4,293	4,116	3,951	64	4,099	C 4,629		.73
											D 4,532		.83
					Total A + AA	Total B + BB	Total C + CC	Total D + DD		Total E + EE			
					5,091	5,302	5,096	4,901		4,163			
1983	.639	.639	.639	.639	2.174	2.174	2.174	2.174	.020	.960	A 4,672	5.68	1.01
	x1558	x1605	x1586	x1509	x1888	x1974	x1932	x1812	x3346	x4352	B 4,781		.90
	996	1,026	1,013	964	4,105	4,291	4,200	3,939	67	4,178	C 4,729		.95
											D 4,574		1.11
					Total A + AA	Total B + BB	Total C + CC	Total D + DD		Total E + EE			
					5,100	5,317	5,213	4,904		4,245			

(a) In the first eleven columns, the average student advance, which is used as the multiple, is given in dollars and all other figures are given in millions. Thus the equation is to be read: "641,000 students, multiplied by $1428, which is the average advance taken from the TAP (tuition + $1000 for "other costs"), gives a total advance of $915,000,000 for this sector and type of institution in 1980."

TABLE III - Page 2

	State 2-yr (A) 10% increase once	(B) 20% increase once	(C) 5% increase p.a.	(D) No increase	State 4-yr (AA) 10% once	(BB) 20% once	(CC) 5% p.a.	(DD) No Increase	Indep. 2-yr (E)	Indep. 4-yr (EE)	Total Costs, States and Independent at 50% participation ($ Millions)	Approp. =4.5)ndexed at 6% ($ Billions)	Excess from Advance ($ Billions)
1984	.636	.636	.636	.636	2.116	2.116	2.116	2.116	.019	.925	A 4,701	6.02	1.32
	x1591	x1641	x1652	x1540	x1941	x2032	x2035	x1861	x3493	x4559	B 4,814		1.21
	1,012	1,044	1,051	979	4,108	4,300	4,306	3,938	67	4,217	C 4,820		1.20
											D 4,600		1.42
					Total A + AA 5,119	Total B + BB 5,344	Total C + CC 5,357	Total D + DD 4,917		Total E + EE 4,284			
1985	.634	.634	.634	.634	2.108	2.108	2.108	2.108	.019	.922	A 4,858	6.38	1.52
	x1626	x1679	x1725	x1572	x1997	x2094	x2149	x1913	x3649	x4797	B 4,977		1.40
	1,031	1,064	1,094	997	4,210	4,414	4,530	4,032	69	4,406	C 5,050		1.33
											D 4,752		1.63
					Total A + AA 5,241	Total B + BB 5,478	Total C + CC 5,624	Total D + DD 5,029		Total E + EE 4,475			
1986	.640	.640	.640	.640	2.127	2.127	2.127	2.127	19	.930	A 5,086	6.76	1.67
	x1664	x1720	x1807	x1606	x2057	x2160	x2275	x1968	x3814	x5012	B 5,214		1.55
	1,065	1,101	1,156	1,028	4,375	4,594	4,839	4,186	72	4,661	C 5,364		1.40
											D 4,974		1.79
					Total A + AA 5,440	Total B + BB 5,695	Total C + CC 5,995	Total D + DD 5,214		Total E + EE 4,733			
1987	.636	.636	.636	.636	2.113	2.113	2.113	2.113	.019	.924	A 5,248	7.16	1.91
	x1704	x1763	x1898	x1642	x2120	x2230	x2415	x2026	x3889	x5259	B 5,384		1.78
	1,083	1,122	1,207	1,044	4,480	4,712	5,103	4,281	74	4,859	C 5,622		1.54
											D 5,129		2.03
					Total A + AA 5,563	Total B + BB 5,834	Total C + CC 6,310	Total D + DD 5,325		Total E + EE 4,933			
1988	.621	.621	.621	.621	2.065	2.065	2.065	2.065	.019	.903	A 5,373	7.59	2.22
	x1746	x1809	x2090	x1681	x2187	x2304	x2571	x2088	x4174	x5521	B 5,512		2.08
	1,084	1,123	1,242	1,044	4,516	4,758	5,305	4,312	79	5,064	C 5,847		1.74
											D 5,250		2.34
					Total A + AA 5,602	Total B + BB 5,881	Total C + CC 6,551	Total D + DD 5,356		Total E + EE 5,143			
1989	.599	.599	.599	.599	1.996	1.996	1.996	1.996	.018	.871	A 5,355	8.05	2.70
	x1791	x1858	x2113	x1722	x2258	x2382	x2744	x2153	x4370	x5798	B 5,498		2.55
	1,073	1,113	1,265	1,031	4,507	4,754	5,477	4,297	79	5,050	C 5,936		2.11
											D 5,229		2.82
					Total A +AA 5,580	Total B + BB 5,867	Total C +CC 6,742	Total D + DD 5,328		Total E + EE 5,129			

TABLE III - Page 3

	State 2-yr (A) 10% increase once	(B) 20% increase once	(C) 5% increase p.a.	(D) No increase	State 4-yr (AA) 10% once	(BB) 20% once	(CC) 5% p.a.	(DD) No Increase	Indep. 2-yr (E)	Indep. 4-yr (EE)	Total Costs, State and Independent at 50% participation ($ Millions)	Approp. = 4.5 Indexed at 6% ($ Billions)	Excess from Advance ($ Billions)
1990	.577	.577	.577	.577	1.917	1.917	1.917	1.917	.017	.839	A 5,362	8.53	3.17
	x1838	x1909	x2239	x1765	x2333	x2465	x2936	x2222	x4578	x6092	B 5,509		3.00
	1,061	1,102	1,292	1,018	4,472	4,725	5,628	4,260	79	5,111	C 6,055		2.47
											D 5,234		3.30
					Total A + AA 5,533	Total B + BB 5,827	Total C + CC 6,920	Total D + DD 5,278		Total E + EE 5,190			
1991	.567	.567	.567	.567	1.883	1.883	1.883	1.883	.017	.824	A 5,487	9.04	3.55
	x1888	x1964	x2379	x1811	x2413	x2553	x3149	x2295	x4799	x6403	B 5,655		3.38
	1,071	1,144	1,349	1,027	4,544	4,807	5,930	4,321	82	5,276	C 6,319		2.72
											D 5,353		3.69
					Total A + AA 5,615	Total B + BB 5,951	Total C + CC 7,279	Total D + DD 5,348		Total E + EE 5,358			
1992	.566	.566	.566	.566	1.880	1.880	1.880	1.880	.017	.823	A 5,733	9.58	3.85
	x1941	x2022	x2535	x1860	x2498	x2646	x3385	x2373	x5033	x6733	B 5,858		3.72
	1,099	1,114	x1,435	1,053	4,696	4,974	6,364	4,461	86	5,541	C 6,713		2.87
											D 5,571		4.01
					Total A + AA 5,840	Total B + BB 6,088	Total C + CC 7,799	Total D + DD 5,514		Total E + EE 5,627			
1993	.574	.574	.574	.574	2.008	2.008	2.008	2.008	.017	.835	A 6,173	10.15	3.98
	x1997	x2083	x2709	x1912	x2587	x2745	x3642	x2455	x5281	x7083	B 6,356		3.79
	1,146	1,196	1,554	1,097	5,195	5,480	7,313	4,927	90	5,914	C 7,436		2.71
											D 6,014		4.14
					Total A + AA 6,341	Total B + BB 6,708	Total C + CC 8,867	Total D + DD 6,024		Total E + EE 6,004			
1994	.574	.574	.574	.574	2.008	2.008	2.008	2.008	.017	.835	A 6,380	10.76	4.38
	x2057	x2148	x2903	x1967	x2682	x2850	x3938	x2542	x5544	x7454	B 6,637		4.12
	1,181	1,233	1,639	1,129	5,385	5,723	7,908	5,014	94	6,224	C 7,933		2.83
											D 6,231		4.53
					Total A + AA 6,566	Total B + BB 6,956	Total C + CC 9,547	Total D + DD 6,143		Total E + EE 6,318			
1995	.574	.574	.574	.574	2.008	2.008	2.008	2.008	.017	.835	A 6,729	11.41	4.68
	x2220	x2216	x3118	x2025	x2783	x2961	x4261	x2635	x5823	x7847	B 6,935		4.47
	1,219	1,272	1,790	1,162	5,588	5,946	8,556	5,291	100	6,552	C 8,499		2.91
											D 6,553		4.86
					Total A + AA 6,805	Total B + BB 7,218	Total C + CC 10,346	Total D +DD 6,453		Total E + EE 6,652			

III. -REPAYMENT

I do not propose to make detailed analyses of the IDES and DRI repayment models.

The IDES study is directed to a completely different question than that to which this paper is addressed. IDES' stated task was to analyze the "real cost" of six different programs for financing higher education. It is thus a comparative study and, in order to devise a suitable model for analysis, its computer simulation (a) is a comparative cost-analysis rather than a close simulation of the TAF.

My brief has been to answer the question: if the TAF is implemented by Congress, (A) will the Fund be sufficient from the outset to meet student needs, (B) will the fund become self-sustaining, and (C) if so, when?

Even were the IDES and DRI models comparable (and no two computer models are ever readily comparable), I think I have raised in the preceding parts of this paper enough doubts concerning the basic data fed into the computer by these models to feel that a detailed analysis of either would be profitless.

I have instead tried to adopt such elements of each as seemed useful in the TAFSIM model.

A. DRI

(1) DRI's Table 8 (Projection of mean incomes, male and female) seems to me totally out of line with current experience.

The differential in income between men and women is pegged by DRI at a constant 50.6%. This may be true, at present, of a cross-section of the population, but I do not believe that women in the college-educated group will for long earn one-half of what men earn. The Census Bureau (U. S. Department of Commerce, Current Population Reports, "Money Income in 1975 of Families and Persons in the United States," Series P-60, No. 105, June 1977) reports that female income is about one-half that of men for all age groups, but about 75% that of men for those under 25.

(a) The VTL (Variable Term Loan) Simulation, as prepared by Stephen P. Dresch and Robert D. Goldberg ("Variable Term Loans for Higher Education-Analytics and Empirics," The Annals of Economic and Social Measurement, I.1, January 1972) and recently revised by Updegrove. This model is available from IDES.

Certainly, experience in advanced industrial nations suggests (A) that the income of women is growing rapidly; (B) that their educational attainments are also rising steeply; and (C) that between legislative imperatives and a rapidly declining birth-rate, one may expect male and female income to reach something like parity well within a generation.

DRI assumes a differential growth rate in mean income of 11% for men aged 25-34 and 10% for women in the same age group. If anything, one would expect that as women improve their economic situation the growth rate in female income will exceed that of men.

(2) I am, on the other hand, in complete agreement with DRI that the complexity of repayment schedules for married couples -- whether both have TAF obligations, or only one, or only the non-earning one -- have not yet been considered in any of the models. In the absence of experience as to how the TAF will work in practice, I was unable to build this factor into the TAFSIM model.

(3) Another (though minor) factor left out is the administrative cost of the TAF. IDES estimates this as 5% of the total borrowing in any given year, but I find that excessively high, as IRS computers should be able to work on a model strictly analogous with collections for F.I.C.A. taxes. A subsequent TAFSIM simulation (since carried out on three of the TAFSIM models) might include a figure for administrative costs, which I would estimate at 1% of the congressional appropriation in each year.

(4) I find the rest of the DRI analysis of repayment schedules and of the feasibility of the TAF somewhat tendentious. I must say, however, that the "potential problems" envisaged by DRI on pages 4-7 of its Analysis strike me as being in the main elements that the TAF plan intended: such as that repayment be income-related or income-contingent, or that tuition and enrollment restraints will be needed to prevent possible abuses. I do not see anything surprising or wrong in the prospect that under the TAF students with low-income expectations would receive cheaper loans, but take this to be one of the principal designs of the plan; likewise I assume that the program imposes high interest rates for the wealthy in order to discourage the wealthy, who do not need the TAF, from participation. I also find that contrary to their contention, the proposed TAF legislation is fully indexed, and that there is considerable discussion among those concerned at Boston University that some more sophisticated index reflecting the labour-intensive nature of higher education should be used in preference to the CPI. Finally, I cannot agree that students would deliberately choose programs where default is possible; or that the Congress would allow such programs to continue for long if they were being abused in such a manner. I am interested in DRI's point about migratory patterns, but I have dealt with that point in the section on enrollment.

B. IDES

(1) I have no quarrel with the IDES study, which is a very interesting exercize in economic analysis. But, being a purely economic model, it does ignore -- and deliberately -- the social worth and political desirability of such a program as the TAF and also pays only minimal attention to the critical condition of middle-class and poor families seeking to finance their children's education, which I take to be the starting-point of the TAF proposal.

(2) I quite agree with Mr Dresch's point that the TAF has an in-built subsidy; I further take it that such was the intent of its framers. My understanding of Mr. Dresch's position is that his basic objection, to judge from the apprehensions he has voiced about possible "overinvestment in higher education," is against the subsidization of higher education by any means; such an objection is not specifically directed against the TAF or against student loan plans, and indeed would apply far more strongly to federal grant programs such as BEOG, or to increased tax support for state institutions.

C. The TAFSIM Model

The TAFSIM model is based throughout, year by year, on the data available in the tables, and as the model is now programmed it is capable of being fed any set of variants that one might wish to introduce, so that if the enrollment curve or any other variable is disputed, it is a simple matter to feed the model the necessary raw data.

The following are the assumptions in the model:

(1) Fifty percent of the eligible sophomores, juniors, and seniors are assumed to participate in the program each year. The participation rate can be varied manually.

(2) The amount borrowed is assumed in all cases to be the maximum allowed.

(3) The amounts available are based upon the prices introduced into the model according to the type of institution (2-year and 4-year) and the sector (state and independent).

(4) The borrowing distribution is divided into five brackets, with the distribution of these brackets representing a composite of the state and independent sectors. (a)

(a) The percentage in each bracket was established on the basis of data in the College Planning Search Book, issued by the American College Testing Program.

(5) The total number of students participating annually and the prices they pay has been calculated annually according to the Tables included in this report.

(6) The advances paid out are adjusted to a constant rate of inflation, which is set at 6% pa.

(7) The borrowing distribution is independent of the inflation rate.

(8) At the end of every school year, the graduating class will have accumulated an average advance by students in each of the five borrowing brackets.

(9) Any student is responsible for the average amount in his bracket, plus an additional percentage of this figure, which in the case of this model is 50% for the surcharge which effectively insures the program against the death, unemployment, or underemployment of the recipient.

(10) Upon graduation, seniors enter the work force in the first taxable year in which they become eligible for tax. (For further refinements, see 11.M, below).

(11) The lifetime earning pattern of each class is computed as the simulation proceeds. The assumptions for this computation are listed here below:

A. A segment of the graduating class enters each of the six income brackets.

B. Every income bracket contains students who have borrowed at the five different levels.

C. The amount borrowed does not affect future level of income.

D. A matrix containing six income brackets and six borrowing levels is constructed. Each element of this matrix reflects the amount owed per student of a particular income and borrowing level.

E. This amount decreases as payments are made and ceases when the debt is repaid.

F. The matrix includes a differential for male and female earnings on a scale of female= 8% less than male (constant). Borrowing distribution is not affected by any distinction of sex.

G. For the purposes of this constant, the female component is assumed to be 49% of the total.

H. A lifetime earning pattern table was devised from 1975 Bureau of Labor statistics.

I. A maximum of 35 work-years is employed. It should be noted, however, that the extension of the retirement age will in most cases make 40-45 years a more realistic maximum.

J. A gradual shift of workers from lower to upper income brackets takes place with age, and as segments of the labour force move to a higher bracket, the income-advance matrix shifts accordingly. A worker may only shift to the next higher bracket in any given year, negative shifts are not allowed, and increases cease after thirty work-years.

K. Each earning bracket is assigned a mean income value. This value is adjusted annually for inflation.

L. The value of the lowest bracket is adjusted to reflect unemployed workers indebted to the fund.

M. Entry into the repayment matrix is delayed according to the formula (a) developed by IDES, which assumes the following college retention profile. Of every 100 entering freshmen, 25 are assumed to drop out before entering the sophomore year, and so forth.

YEAR	NUMBER OF ENTRANTS	No. OF EXITS
1	100	25
2	75	10
3	65	5
4	60	31
5	29	6
6	23	15
7	8	2
8	6	6

(a) See Dresch and Goldberg, "Variable Term Loans," Annals of Economic and Social Measurement, 1972, p. 69, Table 1. This table was interpolated from data provided by Robert R. Berls, "Higher Education Opportunity and Achievement in the United States," pp. 161 and 169 of the Joint Economic Committee papers on The Economics and Financing of Higher Education in the United States, U.S. Government Printing Office, Washington 1969.

N. The Dresch-Goldberg model assumes (following Bell 1969) a graduate-school retention rate of 43%; that is, it is assumed that 43% of those who receive the baccalaureate enter graduate or first-professional education. This figure seems high to the author of this report. Therefore the model specifies another variable, in which only 15% of baccalaureates enter graduate or first-professional education. These variables show the amount of lag time that may be expected to elapse before the commencement of repayment.

O. No default is specified.

P. A table of repayment rates corresponding to the income-advance matrix is read, and these rates determine the annual amount of payback for each income and advance level.

Q. The last repayment for a particular group may involve a partial sum if the tax exceeds the amount owed.

R. A mortality rate increasing by age, based upon the most recent figures, is used throughout.

11. Two forms of appropriation are posited:

Congressional Appropriation Plan I. An initial appropriation, at a fixed sum (4.5 billion dollars adjusted to inflation), is made and all excess of appropriation over expenditure in any given year is left in the Tuition Advance Fund; repayments and excess funds are invested at a rate of 6%.

Congressional Appropriation Plan II. An annual appropriation in which unexpended funds in any given year revert to the Treasury and repayments are invested at a rate of 6%.

Table IVA-D shows the schedules of yearly advances, repayments, and excesses of appropriations over advances under these assumptions. In each table, the fourth column shows the annual amount of repayment plus interest; the fifth column shows the annual amount of repayment plus the excess of appropriations over advances, plus interest. If excesses are returned to the fund (Appropriation Plan I) then the breakeven point is reached when the sums in the fifth column exceed those in the first column, which show the amounts advanced. This point is reached in the tenth year under Plan D and in the eleventh year under Plans A and B. Under Plan C the breakeven point will not be reached until the seventeenth year, and therefore the table for Plan C has been extended until 1997, assuming enrollment to remain stable at the 1995 level.

Such a table is provided for each of the four tuition plans for the state sector (A-D). For each plan, the schedule is shown for each of the two graduate-school retention rates (43% and 15%).

Table IVA Repayments Under Tuition Plan A
10% One-time Tuition Increase in State Sector
(in Billions)

	Advance	Repayment	Excess of Appropriation Over Advance	Repayment + Interest	Repayment + Excess + Interest
Retention Rate 43%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.53	0.05	0.53	0.05	0.60
1982	4.63	0.12	0.73	0.12	0.91
1983	4.67	0.22	1.01	0.23	1.34
1984	4.70	0.34	1.32	0.36	1.85
1985	4.86	0.49	1.52	0.54	2.31
1986	5.09	0.60	1.68	0.68	2.72
1987	5.25	0.72	1.92	0.84	3.25
1988	5.37	0.88	2.23	1.05	3.91
1989	5.36	1.05	2.70	1.28	4.78
1990	5.36	1.25	3.18	1.56	5.75
1991	5.49	1.45	3.56	1.85	6.68
1992	5.73	1.65	3.87	2.16	7.58
1993	6.17	1.85	4.00	2.49	8.37
1994	6.38	2.08	4.40	2.87	9.51
1995	6.73	2.26	4.70	3.23	10.56
Retention Rate 15%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.53	0.08	0.53	0.08	0.63
1982	4.63	0.17	0.73	0.17	0.96
1983	4.67	0.27	1.01	0.29	1.40
1984	4.70	0.40	1.32	0.43	1.92
1985	4.86	0.56	1.52	0.62	2.40
1986	5.09	0.66	1.68	0.76	2.79
1987	5.25	0.78	1.92	0.92	3.33
1988	5.37	0.95	2.23	1.15	4.01
1989	5.36	1.11	2.70	1.37	4.87
1990	5.36	1.30	3.18	1.65	5.84
1991	5.49	1.50	3.56	1.95	6.77
1992	5.73	1.69	3.87	2.25	7.67
1993	6.17	1.90	4.00	2.60	8.48
1994	6.38	2.11	4.40	2.96	9.60
1995	6.73	2.30	4.70	3.33	10.66

Table IVC Repayments Under Tuition Plan C
5% Annual Tuition Increase in State Sector
(in Billions)

	Advance	Repayment	Excess of Appropriation Over Advance	Repayment + Interest	Repayment + Excess + Interest
Retention Rate 43%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.49	0.05	0.57	0.05	0.64
1982	4.63	0.12	0.73	0.23	0.92
1983	4.73	0.22	0.05	0.23	1.28
1984	4.82	0.23	1.20	0.26	1.73
1985	5.05	0.49	1.33	0.54	2.12
1986	5.36	0.60	1.41	0.68	2.43
1987	5.62	0.73	1.55	0.85	2.85
1988	5.85	0.87	1.75	1.04	3.36
1989	5.94	1.03	2.12	1.26	4.09
1990	6.06	1.23	2.48	1.54	4.90
1991	6.32	1.44	2.73	1.84	5.65
1992	6.71	1.65	2.89	2.16	6.35
1993	7.44	1.87	2.73	2.51	6.80
1994	7.93	2.11	1.85	2.90	7.57
1995	8.50	2.31	2.93	3,27	8.30
1996	9.09	2.53	3.03	3.69	9.12
1997	9.64	2.78	3,20	4.16	10.09
Retention Rate 15%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.49	0.08	0.57	0.08	0.67
1982	4.63	0.17	0.73	0.17	0.96
1983	4.73	0.27	0.95	0.29	1.34
1984	4.82	0.40	1.20	0.43	1.80
1985	5.05	0.56	1.33	0.62	2.20
1986	5.36	0.67	1.41	0.77	2.51
1987	5.62	0.79	1.55	0.93	2.93
1988	5.85	0.93	1.75	1.13	3,45
1989	5.94	1.10	2.12	1.36	4.19
1990	6.06	1.28	2.48	1.63	4.98
1991	6.32	1.49	2.73	1.93	5.75
1992	6.71	1.70	2.89	2.26	6.45
1993	7.44	1.93	2.73	2.63	6.92
1994	7.93	2.15	2.85	3.00	7.67
1995	8.50	2.35	2.93	3,38	8.41
1996	9.09	2.57	3.03	3.81	9.23
1997	9.64	2.81	3.20	4.28	10.20

Table IVB Repayments Under Tuition Plan B
20% One-time Tuition Increase in State Sector
(in Billions)

	Advance	Repayment	Excess of Appropriation Over Advance	Repayment + Interest	Repayment + Excess + Interest
Retention Rate 43%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.63	0.05	0.43	0.05	0.51
1982	4.73	0.12	0.63	0.12	0.81
1983	4.78	0.22	0.90	0.23	1.23
1984	4.81	0.34	1.21	0.36	1.73
1985	4.98	0.49	1.40	0.54	2.18
1986	5.21	0.60	1.55	0.68	2.57
1987	5.38	0.72	1.78	0.84	3.08
1988	5.51	0.86	2.08	1.03	3.71
1989	5.50	1.02	2.55	1.25	4.56
1990	5.51	1.25	3.00	1.56	5.54
1991	5.66	1.45	3.38	1.85	6.45
1992	5.86	1.66	3.72	2.17	7.38
1993	6.36	1.88	3.79	2.52	8.18
1994	6.64	2.10	4.12	2.89	9.12
1995	6.94	2.30	4.47	3.27	10.25
Retention Rate 15%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.63	0.08	0.43	0.08	0.54
1982	4.73	0.17	0.63	0.17	0.86
1983	4.78	0.27	0.90	0.29	1.28
1984	4.81	0.40	1.21	0.43	1.80
1985	4.98	0.56	1.40	0.62	2.26
1986	5.21	0.66	1.55	0.76	2.65
1987	5.38	0.79	1.78	0.93	3.18
1988	5.51	0.92	2.08	1.12	3.80
1989	5.50	1.08	2.55	1.34	4.65
1990	5.51	1.30	3.00	1.64	5.62
1991	5.65	1.50	3.38	1.94	6.54
1992	5.86	1.70	3.72	2.26	7.47
1993	6.36	1.93	3.79	2.63	8.28
1994	6.64	2.14	4.12	2.99	9.22
1995	6.94	2.34	4.47	3.37	10.36

APPENDIX I

TAF REPAYMENTS UNDER APPROPRIATION PLAN I

The following graphs illustrate the repayment schedules of the TAF under Congressional Appropriation Plan I (see p. 19), in which excesses from the annual appropriations are absorbed by the Fund.

Each of the four Tuition Plans for the state sector (Plans A, B, C, and D) is presented. For each of these plans the repayment schedule is shown for the two graduate-school retention rates used by TAFSIM, 43% and 15%.

The Fund becomes self-sustaining at the point at which line E (repayments plus excess plus interest) intersects line B (advances).

The breakeven point is reached in the tenth year in Plan D.

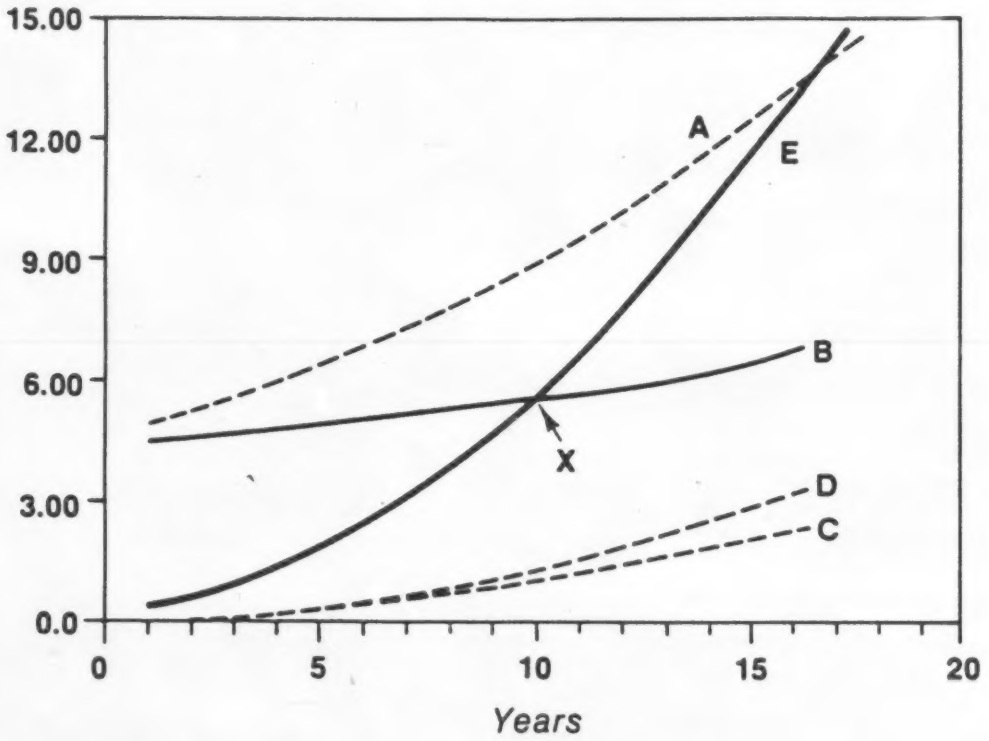
It is reached in the eleventh year in Plans A and B.

It is reached in the seventeenth year in Plan C.

Table IVD Repayments Under Tuition Plan D
No Tuition Increase in State Sector
(in Billions)

	Advance	Repayment	Excess of Appropriation Over Advances	Repayment + Interest	Repayment + Excess + Interest
Retention Rate 43%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.44	0.05	0.62	0.05	0.69
1982	4.53	0.12	0.83	0.12	1.01
1983	4.57	0.22	1.11	0.23	1.45
1984	4.60	0.34	1.42	0.36	1.97
1985	4.75	0.49	1.63	0.54	2.45
1986	4.97	0.62	1.80	0.70	2.89
1987	5.13	0.74	2.04	0.86	3.43
1988	5.25	0.89	2.35	1.06	4.10
1989	5.23	1.05	2.82	1.29	5.50
1990	5.23	1.24	3.31	1.55	5.98
1991	5.35	1.44	3.70	1.85	6.93
1992	5.57	1.63	4.03	2.15	7.86
1993	6.01	1.85	4.16	2.50	8.69
1994	6.23	2.07	4.55	2.86	9.82
1995	6.55	2.25	4.88	3.22	10.92
Retention Rate 15%					
1980	4.44	0.00	0.33	0.00	0.33
1981	4.44	0.08	0.62	0.08	0.72
1982	4.53	0.17	0.83	0.17	1.06
1983	4.57	0.27	1.11	0.29	1.51
1984	4.60	0.40	1.42	0.43	2.04
1985	4.75	0.55	1.63	0.61	2.52
1986	4.97	0.68	1.80	0.77	2.97
1987	5.13	0.81	2.04	0.95	3.52
1988	5.25	0.95	2.35	1.15	4.18
1989	5.23	1.11	2.82	1.38	5.59
1990	5.23	1.29	3.31	1.64	6.07
1991	5.35	1.49	3.70	1.94	7.03
1992	5.57	1.68	4.03	2.24	7.96
1993	6.01	1.90	4.16	2.60	8.79
1994	6.23	2.11	4.55	2.97	9.92
1995	6.55	2.30	4.88	3.33	11.03

Appropriation Plan I. Graph 1.
Tuition Plan A
(State institutions are allowed a 10% one-time tuition increase. Graduate-school retention rate is 43%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

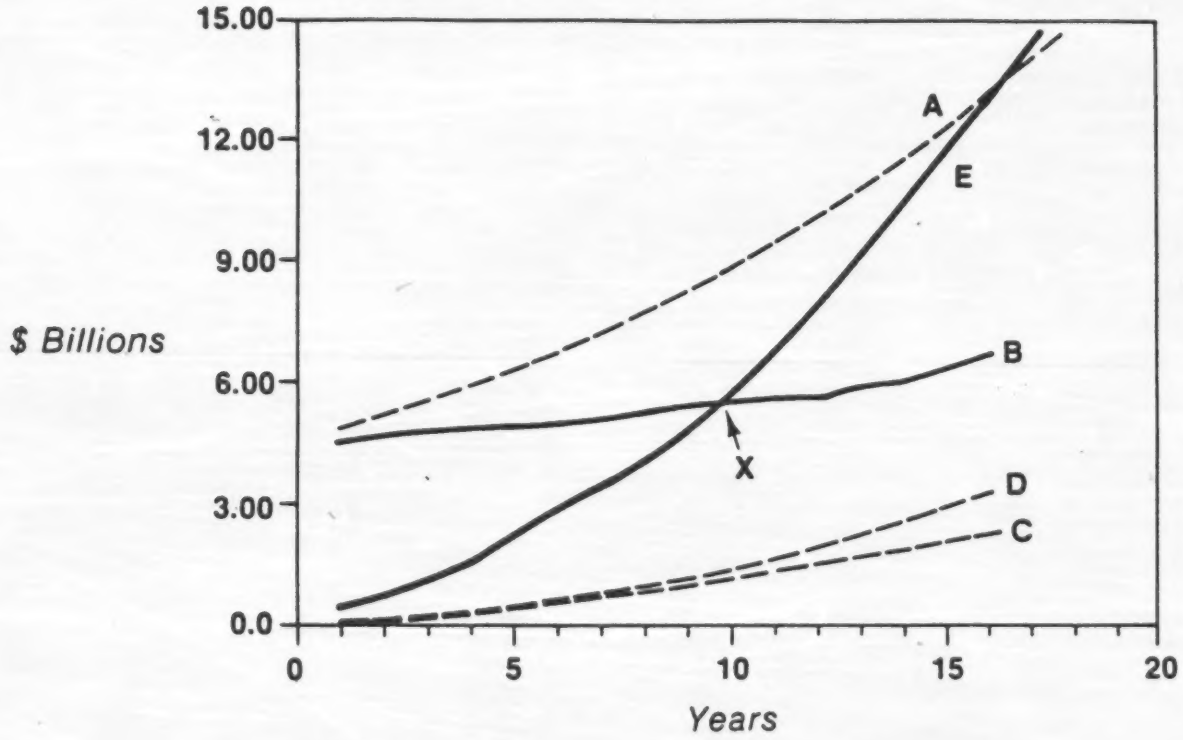
C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

Appropriation Plan I. Graph 2.
Tuition Plan A
(State institutions are allowed a 10% one-time tuition increase. Graduate-school retention rate is 15%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

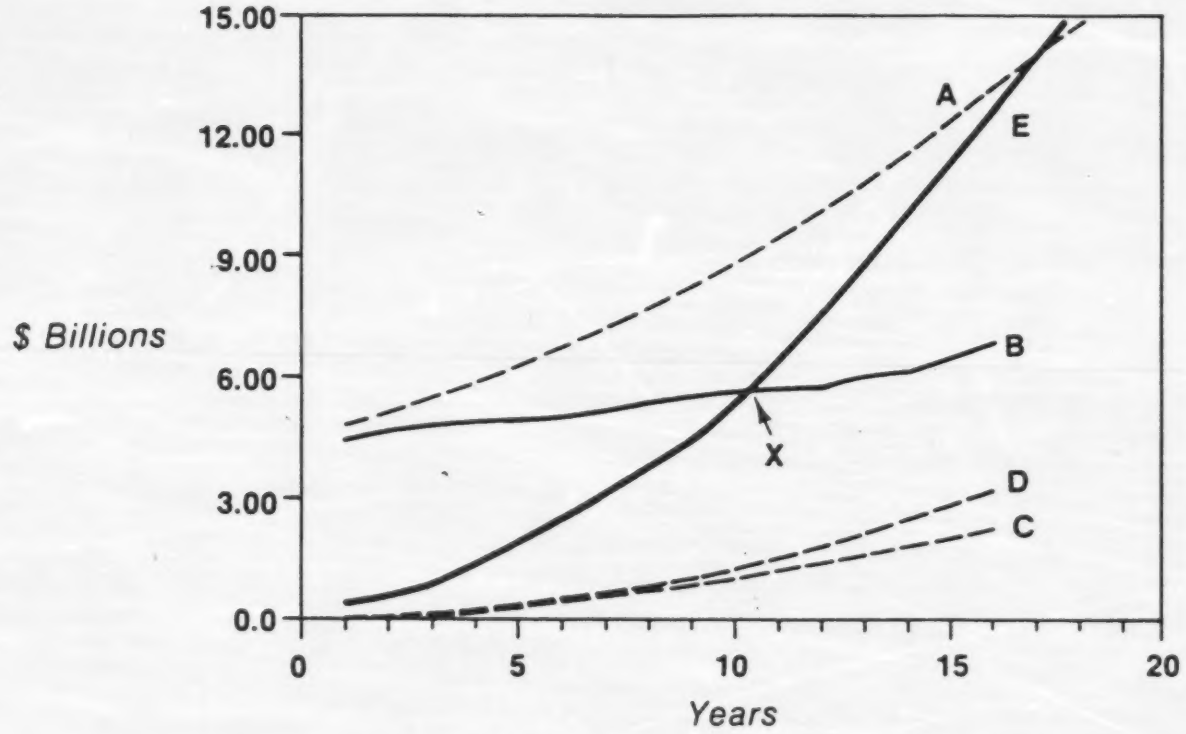
C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

Appropriation Plan I. Graph 3.
Tuition Plan B
(State institutions are allowed a 20% one-time tuition increase. Graduate-school retention rate is 43%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

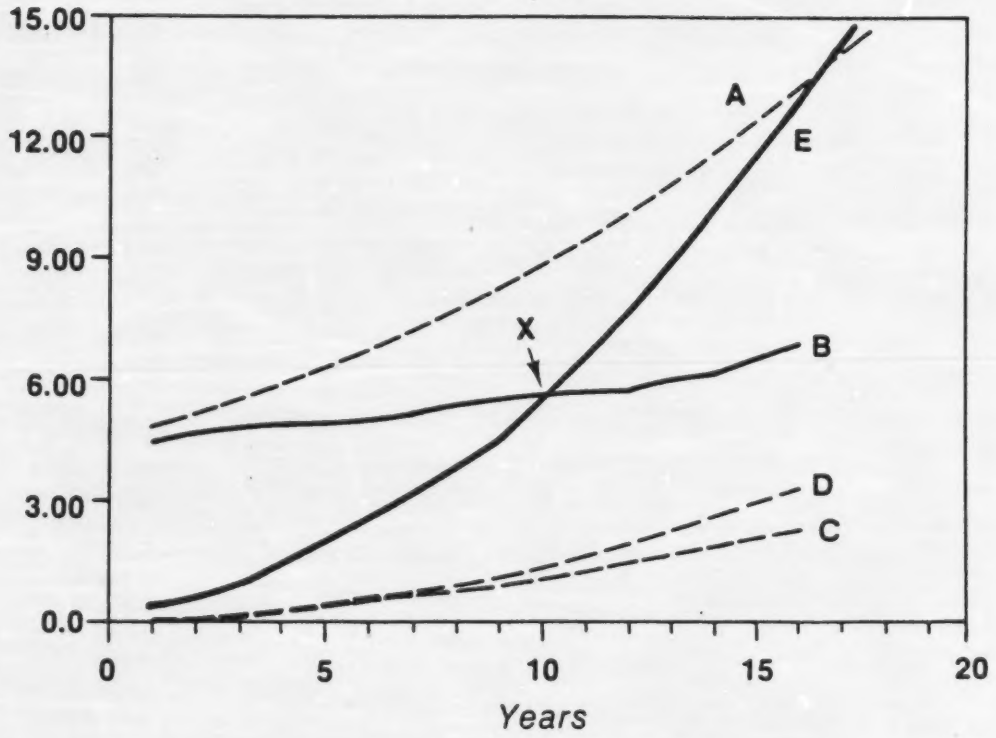
C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

Appropriation Plan I. Graph 4.
Tuition Plan B
(State institutions are allowed a 20% one-time tuition increase. Graduate-school retention rate is 15%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

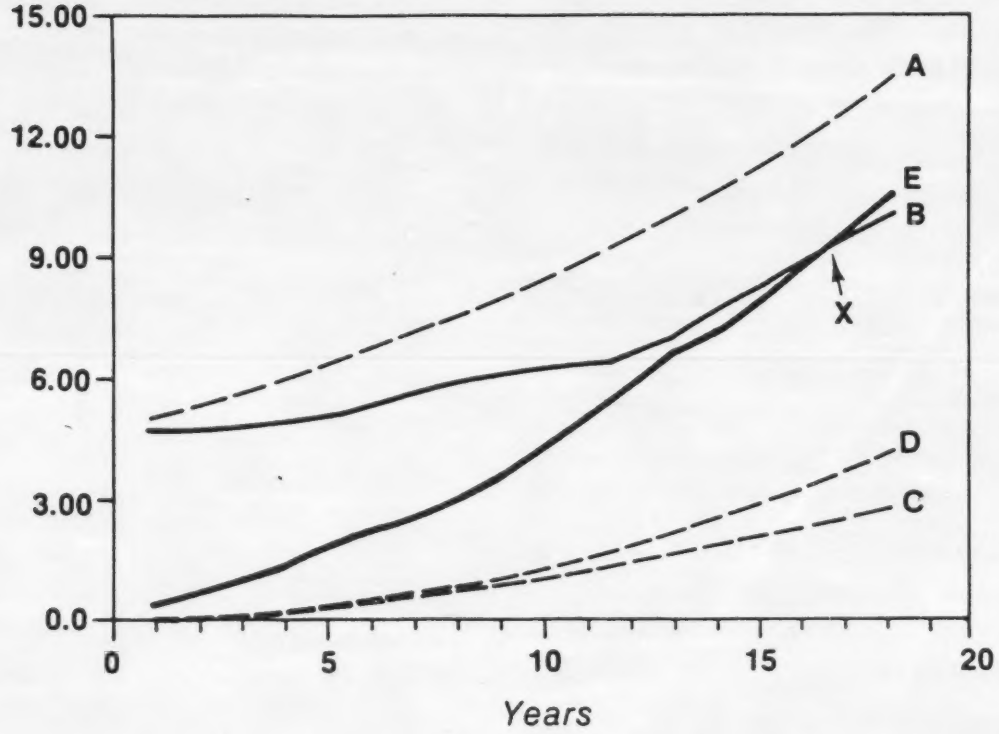
C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

Appropriation Plan I. Graph 5.
Tuition Plan C.
(State institutions are allowed a 5% annual tuition increase. Graduate-school retention rate is 43%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

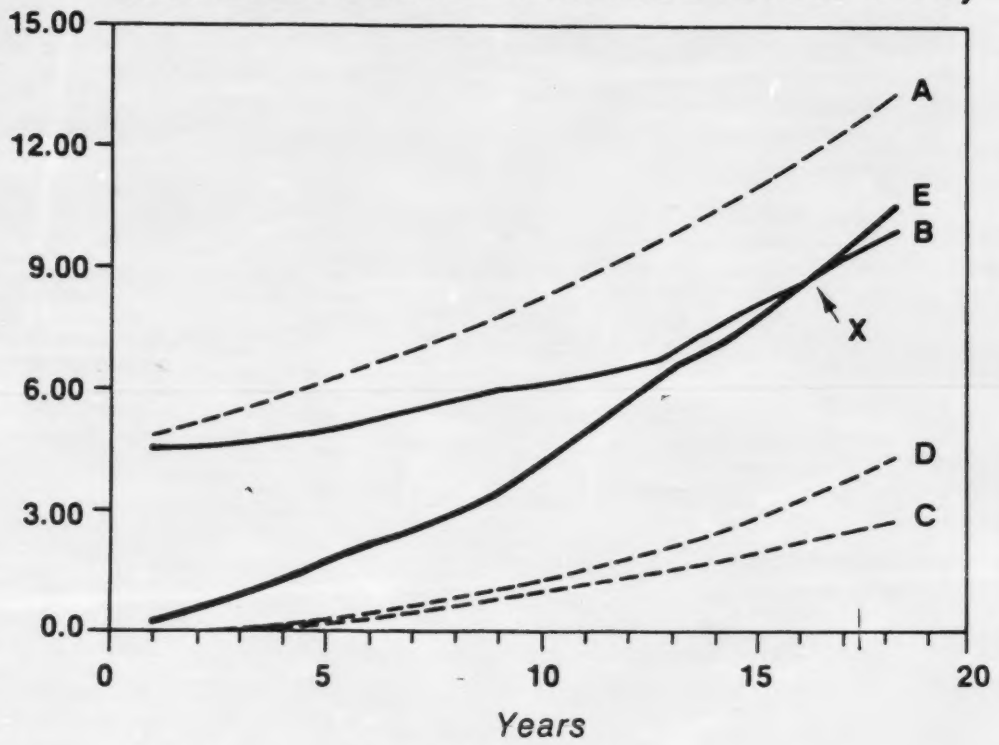
C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

Appropriation Plan I. Graph 6.
Tuition Plan C.
(State institutions are allowed a 5% annual tuition increase. Graduate-school retention rate is 15%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

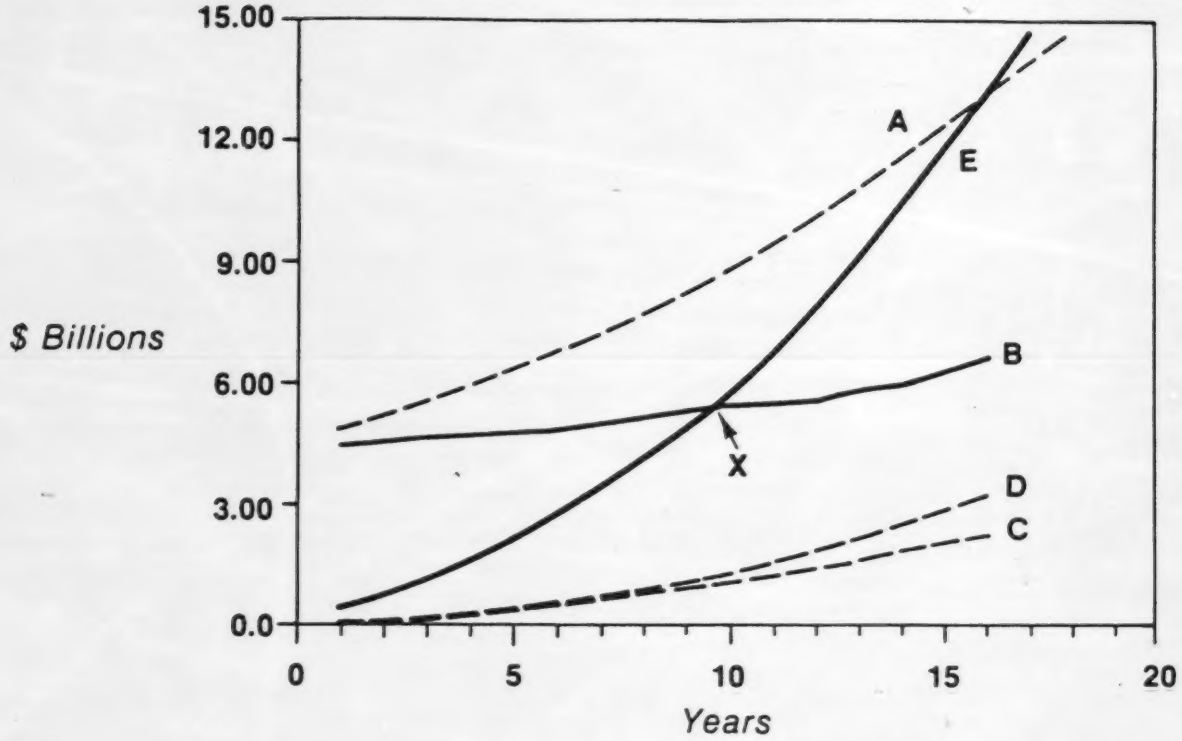
C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

Appropriation Plan I. Graph 7.
Tuition Plan D
(No tuition increase at state institutions. Graduate-school retention rate is 43%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

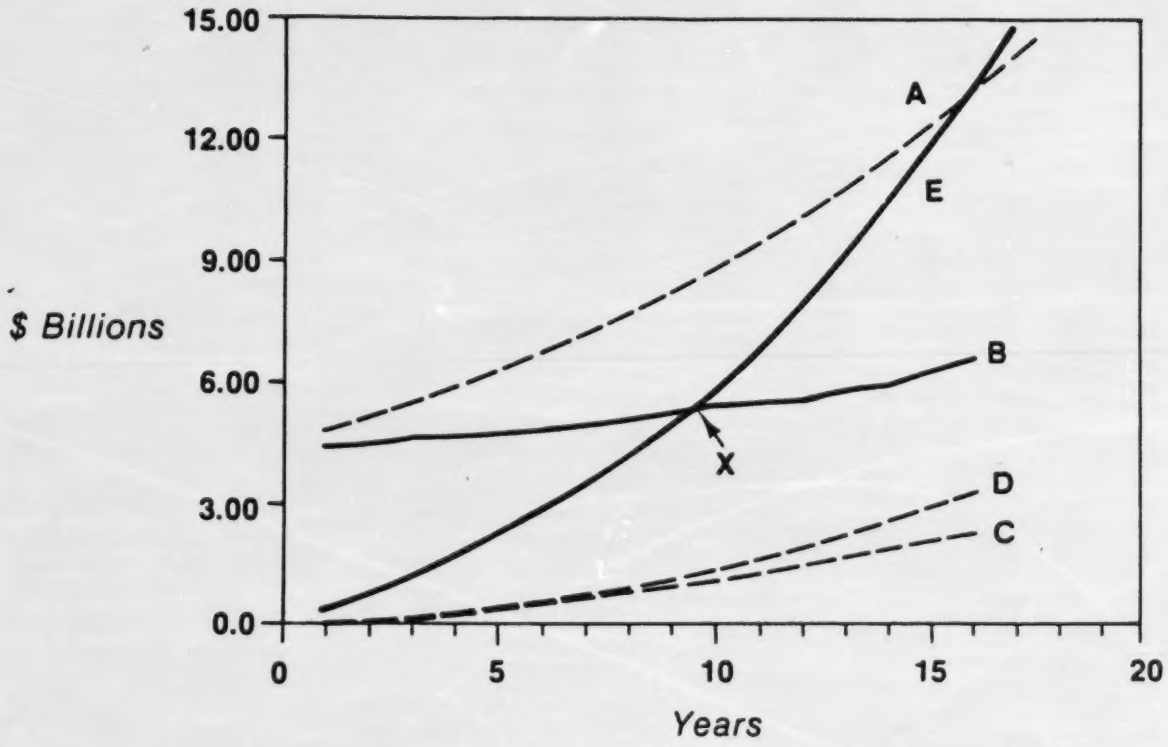
C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

Appropriation Plan I. Graph 8.
Tuition Plan D
(No tuition increase at state institutions Graduate-school retention rate is 15%.)



A = Annual appropriation, starting at $4.5 billion and indexed to inflation at 6%.

B = Total annual advance, assuming 50% participation.

C = Total annual repayment.

D = Total annual repayment, invested at 6% interest.

E = Total annual repayment plus the annual excess of appropriation over advance, invested at 6% interest.

X = Point at which fund becomes self-sustaining.

APPENDIX II

TAF REPAYMENTS UNDER APPROPRIATION PLAN II

The following graphs illustrate the repayment schedule of the TAF under Congressional Appropriation Plan II, in which the excesses from the annual appropriations are not absorbed by the Fund but are returned to the U. S. Treasury.

Projections of college enrollments after 1995 are unreliable because of the absence of live-birth data. It is also unrealistic to try to make projections of prices this far into the future. Therefore, for the purposes of this study, I have assumed that enrollments will remain stable at the 1995 level, and that the advances for the several sectors will continue to increase at the 6% inflation index. It seems unlikely that the 5% annual tuition increase for the state sector entailed by Tuition Plan C will be continued indefinitely, and so it is assumed that after 1995 the annual increment will be dropped and that advances under Plan C will remain stable at the 1995 level, subject only to the 6% inflation index.

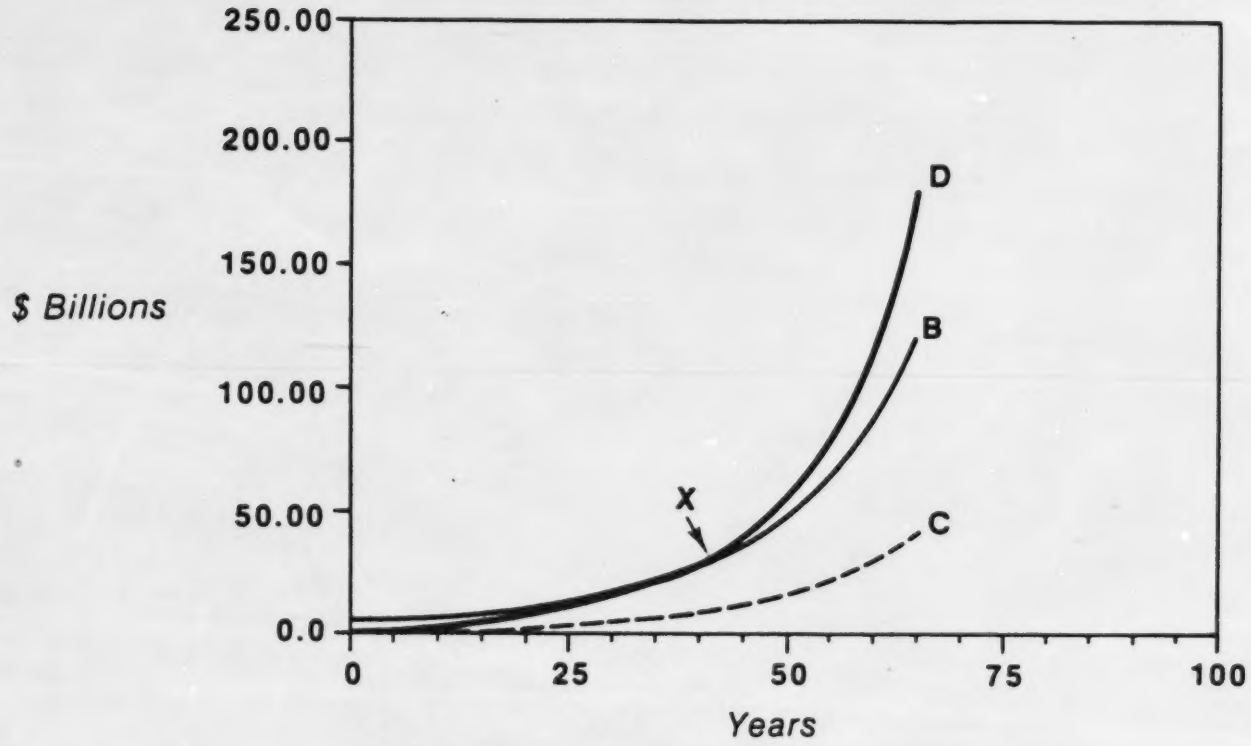
Only the 15% graduate-school retention rate is given here, as the difference created by this variable becomes negligible over a longer time span.

Under Appropriation Plan II, the Fund becomes self-sustaining at the point at which line D (repayments plus interest) intersects line B (advances).

The breakeven point is reached in the 39th year under Tuition Plans A, B, and D.

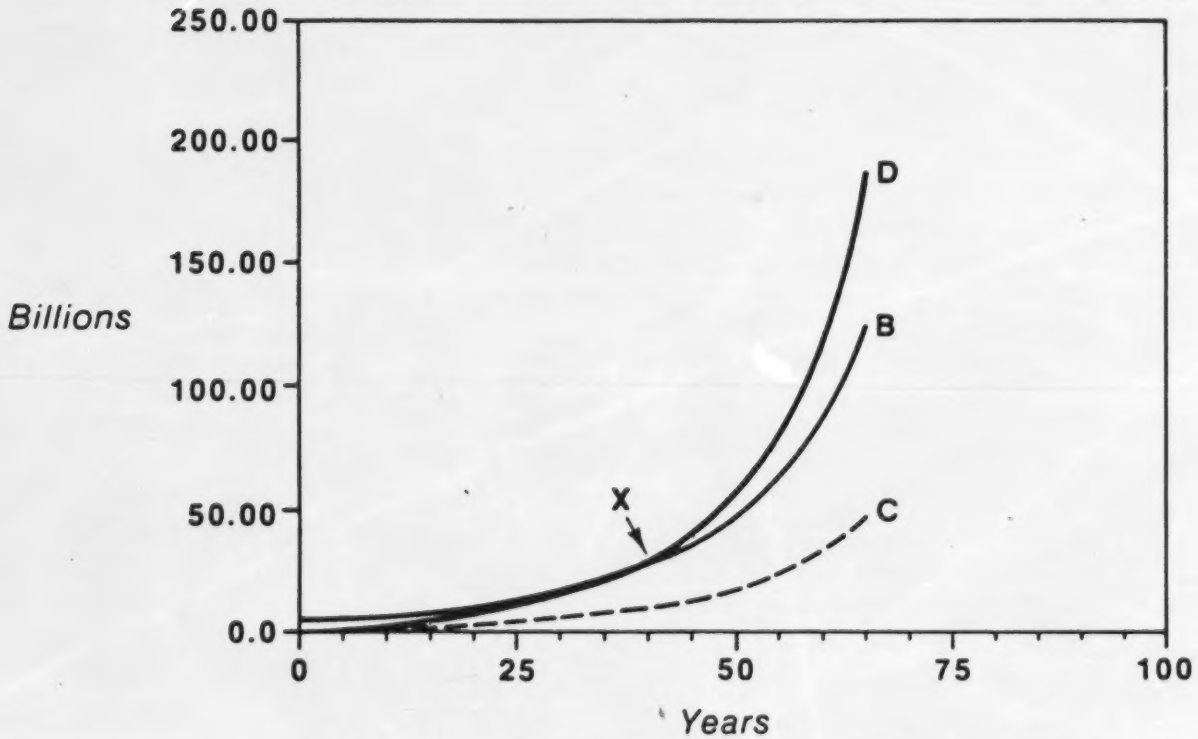
Under Tuition Plan C, given the emendation described above, the breakeven point is reached in the 45th year.

Appropriation Plan II. Graph 1.
Tuition Plan A
(State institutions are allowed a 10% one-time tuition increase. Graduate-school retention rate is 15%.)



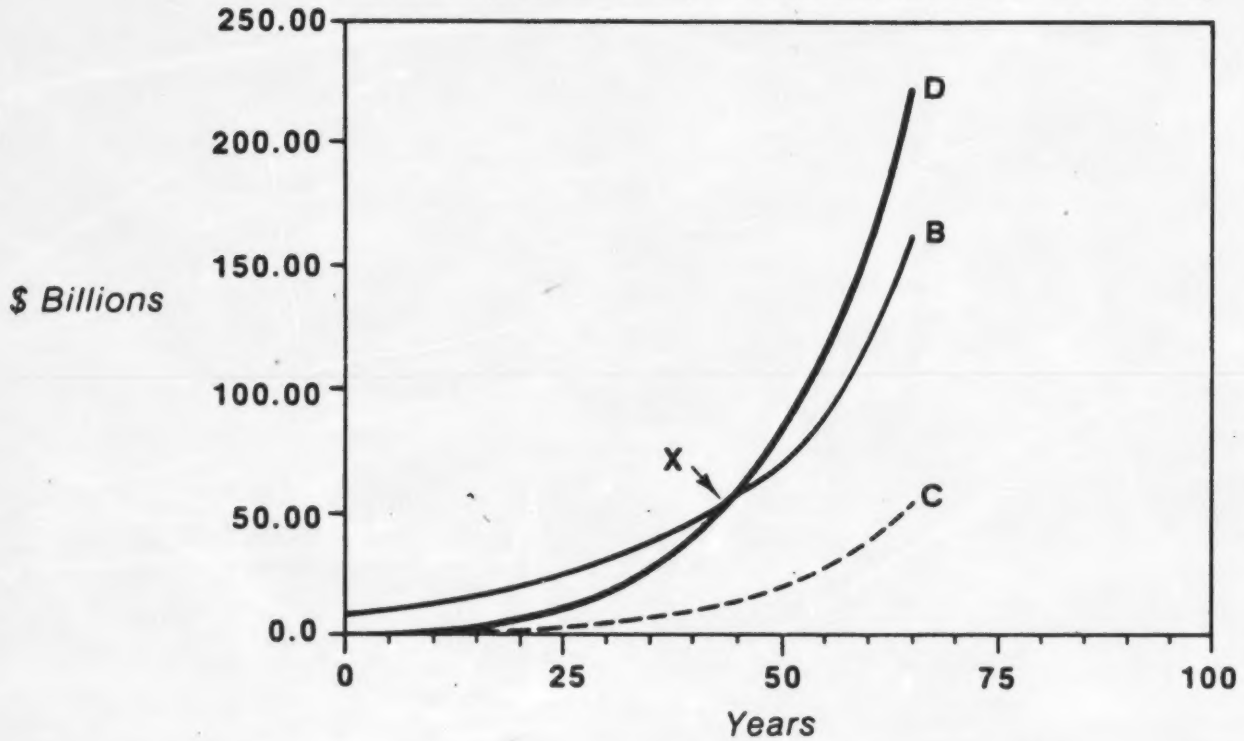
B = Total annual advance, assuming 50% participation.
C = Total annual repayment.
D = Total annual repayment, invested at 6% interest.
X = Point at which fund becomes self-sustaining.

Appropriation Plan II. Graph 2.
Tuition Plan B
(State institutions are allowed a 20% one-time tuition increase. Graduate-school retention rate is 15%.)



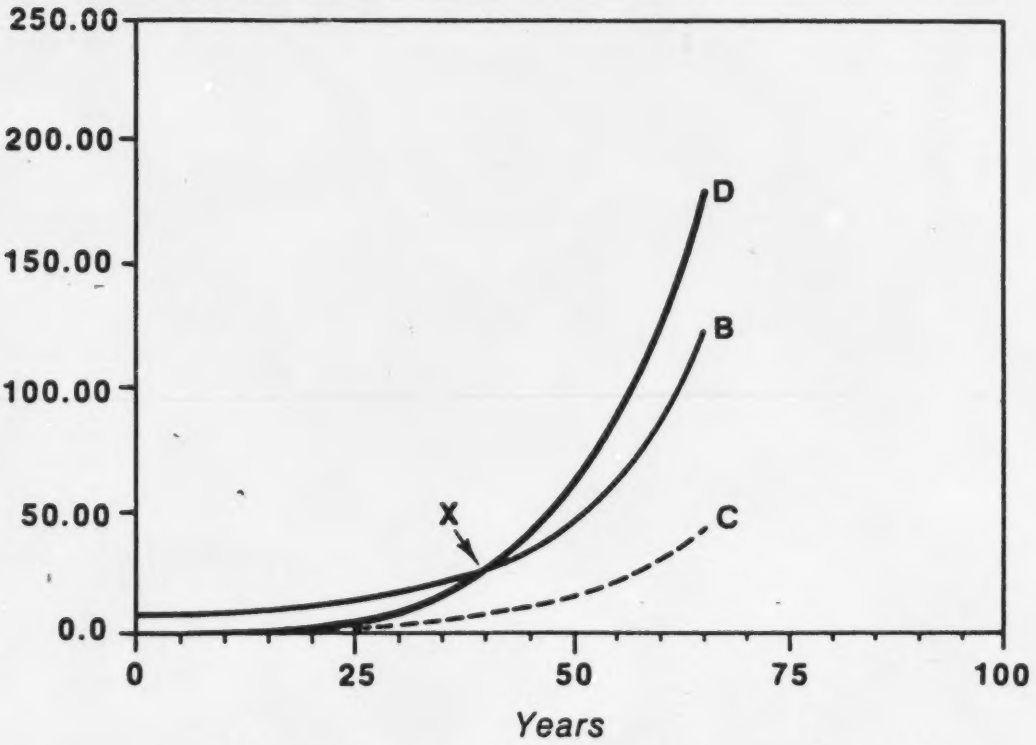
B = Total annual advance, assuming 50% participation.
C = Total annual repayment.
D = Total annual repayment, invested at 6% interest.
X = Point at which fund becomes self-sustaining.

Appropriation Plan II. Graph 3.
Tuition Plan C
(State institutions are allowed a 5% annual tuition increase until 1995. Graduate-school retention rate is 15%.)



B = Total annual advance, assuming 50% participation.
C = Total annual repayment.
D = Total annual repayment, invested at 6% interest.
X = Point at which fund becomes self-sustaining.

Appropriation Plan II. Graph 4.
Tuition Plan D
(No tuition increase at state institutions. Graduate-school retention rate is 15%.)



B = Total annual advance, assuming 50% participation.
C = Total annual repayment.
D = Total annual repayment, invested at 6% interest.
X = Point at which fund becomes self-sustaining.